

## **ABSTRACT**

A molecular memory cell and methods for forming a molecular memory cell, which allow for easy and inexpensive manufacturing and flexibility in memory system design. Embodiments include a non-volatile molecular memory cell, comprising: a substrate having a conductor, a superionic conductor, a polymer layer over said superionic conductor, a layer of metal ions formed from the superionic conductor and residing between said polymer layer and said superionic conductor, and a second conductor over the polymer layer. Other embodiments include methods for forming a molecular memory cell, wherein a superionic conductor is deposited over a suitable substrate having conductor. A polymeric film is then deposited over the superionic conductor via a living polymerization reaction initiated by the superionic conductor. Furthermore, a layer of excess metal ions from the superionic conductor forms on an upper surface of the superionic conductor. A top conductor is then formed on the polymeric film.